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The

LYCHEE

IS A
NATURAL FOR
SOUTH FLORIDA

a cluster
of FRESH
LYCHEE
FRUIT

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LYCHEE ORCHARDS, Inc.
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"THE LYCHEE"
in Florida

by
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THE LYCHEE TREE AND FRUIT

The Lychee (*Litchi chinensis*) is a subtropical evergreen tree that produces one of the world's finest fresh fruits.

The tree is indigenous to China and the fruit is there highly esteemed. It comes from southeastern China where the climate is much like that of Central and South Florida. The fresh ripe fruit is about the size and color of a large ripe strawberry. It has a very thin but tough skin, the upper part of which is removed between the thumb and first finger before the fruit is eaten. It is very high in sugar content and has a flavor all its own. Its great value is as a fresh fruit, but it may be preserved, and it deep freezes perfectly, thus spreading consumption throughout the year.

The fresh fruit of the Lychee tree has for many centuries been considered by the Chinese to be the finest of the fruits. It has met with instant acceptance by the Americans. The Chinese could not bring it into the United States in the fresh state, so they dried it and shipped it in as "Dried Lychees," and which many American consumers call "Lychee (or Litchi) Nuts." The fresh Lychee is as much superior to the dried Lychee as the fresh peach is to the dried peach.

The fruit grows in clusters on the limb tips of evergreen trees that may ultimately reach a height of forty feet with about the same spread. Each tree produces both staminate and pistillate flowers. There are many varieties of Lychee. Fruit producing trees of the variety called Brewster, from Henghwa, Fukien Province, China, are growing in several hundred locations in Florida, ranging from Orlando to Homestead. Both coasts and the Ridge, Everglades and Redlands districts are represented. Fukien province is on the extreme northern fruiting range of the Lychee in China and the Brewster variety is therefore well adapted to Florida.

Not only is the Lychee a most desirable tree on account of its fine fruit, but it is a highly ornamental evergreen doorway tree of symmetrical lines. Several times each year it throws out a new growth of leaves, usually wine colored, and when the fruit is ripe its bright red clusters present a striking object in the landscape.

Like citrus, Lychee seedlings cannot be depended upon to reproduce true to parentage, and as budding is unsuccessful, Chinese air-layering and inarching are depended upon for exact reproduction. It usually requires from four to six years for layered or inarched trees to bear. Seedlings may require twice that length of time.

The Lychee is a subtropical, not a tropical tree. It needs a warm location and yet seems not to fruit well without a win-

ter period cold enough to provide a certain degree of dormancy. It is evergreen and makes a fine dooryard tree as near the equator as the Panama Canal, but does not fruit there. It has not fruited too well in Cuba. It fruits sparingly in the cooler locations of Hawaii. It is grown to some extent in parts of India and the Malay Peninsula. In China its fruiting range on an extensive scale is limited to the southeastern provinces of Kwangtung and Fukien although inferior fruit is produced in the province of Szechwan. Its fruiting range in China is only about 300 miles of latitude.

In a climate closely approximating our own, the Union of South Africa has bearing orchards of 5,000 trees, with a total of 40,000 trees and increasing rapidly. This development has been largely in the last twenty years. Their market is local, London and other European cities.

The Lychee has found difficulty in California, probably on account of the dry atmosphere, and has not been developed in Texas. The tree grows vigorously and fruits well in sections of South Florida which roughly correspond to the climatic conditions of the Lychee district in China.

Analysis of fresh Lychee fruits by Dr. Stahl, obtained from trees in Homestead, Fla., was as follows:

The fruits analyzed averaged approximately 30 to the pound.

Specific gravity 1.064-1.086

	Percent minimum	maximum	Average
Seed	12.0	19.8	15.9
Shell (Pericarp)	9.3	9.9	9.6
Edible portion (Aril)	70.1	78.1	78.2
Moisture	76.5	80.8	72.2
Acid (as citric acid) .....	.96	1.32	1.20
Oil .....	.50	1.60	.97
Protein .....	.20	1.30	.94
Ash .....	.50	1.00	.69
Free Reducing sugars	6.00	7.30	6.89
Hydrolyzable sugars	4.20	6.90	6.68
Total sugars	12.90	14.12	13.57

Wen Hsun Chen reports that the Lychee is a nourishing food. The fresh fruits contain from 10 to 16% of sugars, and about 10% of protein. The pulp is acidulous, containing slightly over 1% of fruit acids which may help relieve thirst and increase appetite by action on digestive enzymes. The fruit is valued in China as a remedy for certain diseases. The Lychee also contains mineral elements which can help correct any diet rich in proteins but lacking in mineral content. Lychee fruits are a very good source of Vitamin C, a good source of Vitamin B, and a fair source of E and D.

The oldest known monograph fully describing any fruit is said to be a fine description of the Lychee tree, its fruit, cultural requirements, etc., done in 1059 A. D. and for which the

author, Ts'ai Hsiang, was honored by the emperor by erecting a monument, said to be still standing, in his honor, in the city of Henghwa, Fukien Province, China. The basis for the monograph was the orchard from which came the Lychee that is now called the Brewster, brought to the United States in 1907 by the Reverend Brewster, a missionary to China.

ORIGIN OF THE SO-CALLED "BREWSTER" LYCHEE

There are many varieties of Lychee. Floridians will doubtless be interested in the origin and antiquity of the one being planted on a commercial scale in Florida, under the trade name of "Brewster", but which in China has for centuries been known as the Chen Purple or Chen Family Purple. This is well described by Mr. Wen Hsun Chen, a native of Henghwa, Fukien Province, China, the home of the Brewster's ancestors:

"Though it seems impossible to determine when the Chen Purple lychee was first brought under culture in Hinghwa district of Fukien province, the first Chen ancestor migrated from central China to Hinghwa in the Tung dynasty, around 400 A.D. It may be said that Chen Family lychee which is now growing in Florida was first cultivated in Hinghwa between the Tung and Sung dynasties. When Tsai Hsiang wrote his monograph on lychee (1059 A.D.) he stated that "the tree of Sung Fragrant lychee is very high and large, the fruits are smaller than the Chen Purple variety, but its flavor is the same as that variety." Some have therefore considered that the Chen Purple variety is a strain from the Sung variety. At that time these lychee trees were already three hundred years old and thriving very well. Unfortunately most of these historical trees were cut down in 1924 when a highway was built through there. There are now still surviving two very ancient trees; one is five feet, 10½ in. in diameter and 75 feet high, while the other has half of the main trunk dead, but a sucker which has come from its base bears good fruits. On the monument erected near the tree you can find the date of planting and many poems cut into the stone to praise these wonderful old trees. It is clear that the Chen variety was planted in Hinghwa district more than a thousand years ago. It is fortunate, indeed, that Mr. W. N. Brewster shipped this lychee to this state in 1903-1906, where it has now established a new home far from its native one.

"The Chen Purple (Brewster) fruits are round to cordate form with raised shoulders, one of which is more prominent than the other. An average fruit measured 3.85 cm. in length, and 3.42 in width and weighed 19 grams. The shell of the fruit is very rough with sharp points, the color of the fruit is purple red, and inner membrane of the shell is characteristically pink in color. The pulp is white, firm and juicy, without rag, very sweet and fragrant. It is high quality and the best lychee in Fukien province."

In Groff's book, later referred to, he has this to say about the ancestors of the Brewster Lychee.

"Of the various Chinese treatises on the Lychee, that of Ts'ai Hsiang, A.D. 1059, is the earliest and most famous." He treats of the extent of territory over which the lychee is grown and proclaims his zeal to place this fruit in the position it deserves among the fruits of the world. He had artists draw pictures of the best varieties he had seen and these he classified. In the second chapter he deals with the Lychee in his native province, Fukien, and he names one variety, the "Chen family purple lychee" of which he says that though there are a thousand varieties and ten thousand trees, no other one can compare with this. He says of it, "When the Chen family are about to harvest their crop of lychee, they close all their gates or doors and people desiring to purchase the fruit must hand in their money through an aperture in the wall, receiving in return its equivalent in lychee fruit. For that which the purchaser was able to obtain he was thankful and considered himself lucky, never daring to argue whether the price was too much or too little."

Groff writes that Dr. Olfert Dapper, Dutch traveller in his work published in Amsterdam in 1670, reports that in Chungkingfu, Szechwan, the lychee grows everywhere in great abundance; and that in south-west Fukien, especially in Hinghwafu, it grows in still greater abundance. He says that when the tree is in fruit it seems to be decorated with purple hearts and is greatly admired by onlookers. He concludes, "The flesh almost melts like sugar in the mouth, and does not hurt anybody. Rightly may this fruit be called 'Queen of Fruits'."

CULTURAL REQUIREMENTS

The soil requirements of the Lychee are about the same as for citrus, the tree preferring a somewhat acid soil. A pH of 6 seems best. The water table should be at least two and one-half feet down.

We quote from the bulletin on "The Litchi in South Africa" by Dr. Raimond H. Marloth, officer in charge of the sub-tropical experiment station at Nelspruit, E. Transvaal:

"A favorite situation for the Chinese to plant their litchi trees is on dykes between the rice fields and on banks of streams. This ensures that the roots of the tree always have access to an abundance of water right throughout the year, particularly from time of flower-bud differentiation (May-June in South Africa) to fruit harvest (December-January in South Africa). However, it is essential, first, that this underground supply of water be moving, for stagnant water results in rotting of roots, and secondly, that the surface of

such water be at least three feet below the soil surface, in which well aerated moist zone the abundance of surface feeding roots of the tree can thrive. Conditions such as the foregoing are to be found in relatively few and restricted instances in areas suited to litchi growing, and therefore it is necessary to have available during most of the year a sufficient amount of irrigation water to supplement the natural rainfall."

Young Lychee trees may be planted at any time of the year. They should be set out in fertile soil, well mulched and watered more frequently than the average fruit tree planting. Well rotted manure may be added to the soil when planting. They can later utilize more fertilizer and water than citrus. If set in low ground they should be elevated when planted. If planted in the summer and the trees show flush growth, they should be lightly shaded with cheese cloth until the new growth is dark green. They should be protected from frost while young. If planted in orchard formation the distance between trees should be forty feet each way, with a tree in the center of the square thus formed. This will require fifty trees to the acre. The center tree will not interfere for fifteen to eighteen years when it can be reduced in size by air-layering the ends of the limbs that interfere, thus creating new young trees. Mulching the young trees is highly desirable.

Lychees seem to require about the same fertilizer formula as citrus, but the much greater leaf spread will, as the trees mature, demand more fertilizer and more water than the average citrus tree. After about four years the Lychee outgrows citrus on suitable soil.

On the subject of frost protection, the Lychee appears to be about as hardy, when mature, as the average sweet orange tree. In most areas of South Florida, freezes that would injure young Lychee trees must be expected every few years and provisions for firing will be necessary.

At Lychee Orchards, Inc., at Laurel the temperature has been as low as 23° for a few hours, but with wood as the heating medium no severe loss was sustained.

At present no known diseases affect the Lychee in Florida although diseases do affect the tree in China, and some will doubtless develop here.

The fruit ripens from about June 20th to July 10th. Bearing usually begins about the fourth year.

Like other fruits, Lychees are subject to crop failures, apparently largely due to lack of water during the season when the fruit is developing. This was especially true in 1949 which was extremely dry from February to June, the fruiting season. Trees that were well watered produced well and those not well watered did not hold their fruit.



Chinese girl holding cluster of fresh Lychees

THE MARKET FOR FRESH LYCHEES

Up to and including 1947 Chinese-American merchants in our cities took most of the American fresh fruit production of Lychees. Americans are just as fond of the fruit as are the Chinese and are eager customers.

In 1949 the fresh fruit sold wholesale as high as \$1.25 per pound in small cartons, F.O.B. production points. The excellence of the fruit and consequent great and increasing demand for it, the limited areas in the world as well as local in which the Lychee will fruit, plus the necessarily slow method of propagating the trees should continue to keep the prices high.

The fresh ripe Lychees hold on the tree for ten days to two weeks. Heretofore they had to be marketed within a few days after picking (unless kept under refrigeration) to retain the bright red color. Even under refrigeration it would retain the bright color only about three weeks. Pliofilm has added to the time Lychees can be kept fresh while retaining the red color under refrigeration, thus extending the marketing season of the fresh fruit. If properly managed, the demand for the fresh fruit at profitable prices, will for many years be greater than can be supplied.

AVAILABLE LYCHEE LAND

The Ridge district of Florida is a strip of fairly high rolling land running north and south through Central Florida. It is in the heart of the citrus belt. The section from about Haines City to Lake Placid is considered to be excellent for commercial Lychee planting. It is the home of a number of fruiting Lychee trees that have gone through the occasional freezes with little or no harm, even though they have had no special care. It is the home of two of the finest Lychee trees in Florida. Each has a spread of more than forty feet and each usually produces up to three hundred pounds or more of fresh Lychees of superior quality. One of these trees, less than 25 years old, and still growing rapidly has produced 400 pounds. That section is fairly free from heavy freezes and yet has sufficient cold weather to provide a dormant period for the Lychee. Most of it has sufficient depth of soil to afford secure root growth. There are also good Lychee locations in Pinellas, Hillsboro, Manatee, Sarasota, Charlotte, Lee and Collier counties on the west coast and from Titusville to Homestead on the east coast. The northern limits of the Lychee in Florida have not been definitely established. This will have to be determined by experience. At present it is considered to be about a line through Leesburg and Sanford.

Much of the land on the lower east coast is apparently not as well adapted to the purpose as the ridge and west

coast districts, although there are bearing Lychee trees in that area. Careful search will doubtless discover suitable land there for commercial planting.

The limiting factor in the development of the Lychee in Florida will probably be suitable available land, as so much of the land upon which Lychees would thrive is planted to citrus.

COMMERCIAL DEVELOPMENT IN FLORIDA

There are some plantings in the Oviedo and Merritt Island districts that offer fine prospects. These are in capable hands and should do well. The Lychee tree has grown well on the east shore of Lake Okeechobee and a few trees are fruiting there. There are scattered Lychee developments in the Palm Beach, Miami and Homestead areas where they found suitable soil. There are new plantings of one, five, ten and twenty acres in a number of locations throughout South Florida.

At this time the largest commercial planting is on the west coast at Lychee Orchards, Inc., Laurel, Sarasota County, Florida. This planting represents one of the first efforts to develop the Lychee on a commercial scale in the United States. Several years ago, planting began as fast as air-layered trees from proven stock of fine quality could be obtained. They are making good growth on several types of soil and a number are now of bearing age. The sale of young air-layered trees from this planting accounts largely for the initial development of the industry in Florida.

Until about six years ago, the commercial development of the Lychee in Florida made little progress. Some officials of the departments of agriculture of the United States and Florida were enthusiastic about it on account of the fine flavored fruit produced, but their organizations, largely through lack of funds and man power, were unable to treat it other than as a welcome step-child. Recently sufficient progress has been made to demonstrate the practicability of its commercial development on thousands of acres of Florida land.

The cost of an orchard of Lychees should be about that of a citrus grove, except for the additional cost of the trees, which are higher than for citrus trees. As stated above, the recommended planting of Lychee trees is forty feet apart, but with one in the center of each square, requiring fifty trees to the acre. After about four years the Lychee outgrows citrus on suitable soil. Cultivation should be about the same as for citrus except that up to date Lychees in Florida have developed no diseases.

During the last few years, the Lychee has demonstrated its ability to grow and fruit in numerous locations and on sev-

eral types of soil in South Florida. It should have a fine future here.

Groff, in his "Lychee and Lungan" quotes a verse by Su Shih, an exiled Chinese poet, written in A.D. 1094:

"Beneath these green mountains where spring rules the
year
The arbutus and loquat in season appear;
And feasting on lychee—three hundred a day—
I shouldn't mind staying eternally here."

*The spelling and pronunciation (lychee) of the common name of *Litchi Chinensis* is that used by G. W. Groff, who lived more than thirty years in the Lychee district of China, in his book entitled, "The Lychee and the Lungan," which is considered the bible of the Lychee industry. Dr. R. H. Marloth, director of the subtropical experiment station of the Union of South Africa, where the Lychee is making fine progress, refers to Groff as the world's leading authority on the Lychee. "Lychee" is also the approved spelling of the 1942 volume of "Standardized Plant Names" published by the Joint American Committee on Horticultural Nomenclature. In China where most of the Lychees are produced, the pronunciation is **lychee**. In India, where some Lychees are produced, the pronunciation is **leechee**.

PROPAGATION BY CHINESE AIR-LAYERING

From the time of the discovery that plants would grow from seed, man has endeavored to devise means of more rapid propagation. Various methods of rooting of cuttings, budding and grafting have been devised, each of benefit to horticulture.

Many centuries ago some smart Chinese gardener, a "green thumber," let us assume, observed the low lying limbs of a tree or other plant rooting through contact with the soil, making a new plant, which could be cut off and transplanted.

Sooner or later it dawned on our Chinese horticultural benefactor that if he would take the dirt up to some of the limbs that could not be pulled down to the ground, tie it on and keep it moist he might be able to propagate more trees. The process finally resulted in what became known as Chinese air-layering which, by refinement of method grew to be a boon to horticulturists.

Although this method of propagating young trees has been employed throughout the world for a great many years, it involved considerable expense because of the necessity of keeping the rooting material wet, and many potential young trees were lost because they were not regularly watered. The use of certain plastic wrappers that hold moisture but permit the passage of respiratory gases is the result of successful efforts to overcome this drawback.



Harvesting fresh Lychees from a 24-year-old tree



1. Completely remove a ring of bark and cambium layer from a section of the branch to be rotted. (The cambium is the thin layer of greenish tissue between the bark and the wood.) This ring should be about one and a half times as wide as the diameter of the branch. Spread over the cut a small quantity of any of the commercial hormone rooting powders now on the market. The trunk of the limb to be layered may be from one-fourth inch to two inches in diameter.

2. Thoroughly wet a ball of sphagnum moss, dirt or other rooting medium and place it so that it covers the cut evenly. For your first attempts you may find moss, if available, or a mixture of moss and dirt somewhat easier to handle than dirt alone. There should be enough medium to provide adequate room for the new roots to grow. For small plants the ball should be nearly two inches in diameter.



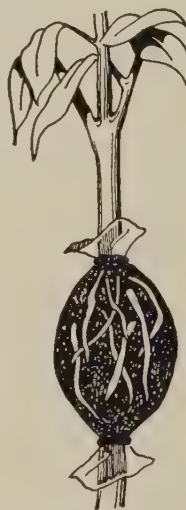
The steps shown above have been the custom for centuries. However, instead of using string as a wrapper and frequently watering the plant, a new method of wrapping around the ball flexible synthetic plastics which hold the moisture but permit the passage of respiratory gases is claimed by the application for patent to obviate the necessity for re-watering the plant, thus saving much labor and effort, and avoiding loss of plants by failure to water them. The wrapping material is being marketed under the registered trade mark "Airwrap."

The "Airwrap" process is the same as described above except that instead of wrapping the rooting medium with string, the plastic material is used as follows.



3. Place under the ball a piece about 7" by 8" of flexible plastic that holds moisture but permits the passage of respiratory gases, with the long side at right angles to the branch. Bring the two edges together and fold over and over until fairly tight about the ball. Twist the ends securely and tie with pure rubber bands or strong waxed cord. No further watering will be required.

4. New roots should begin to form inside the plastic covering within two or three weeks, although rooting time may vary considerably with the different species being propagated. Because of the transparent quality of the covering it will be easy for you to see when a satisfactory root system has developed, thus avoiding the danger of your removing the covering too soon.



5. When roots have been established, cut off your new plant from the parent tree and remove the plastic covering carefully so as not to tear the tender roots. Trim off about half the leaves of the plant to compensate for the shock. Place in a pot of good soil and let stand in a well shaded place for about four weeks, watering well until new leaves begin to appear. Move to semi shade for the next four weeks, after which time your new plant is ready for transplanting to its permanent location.

LYCHEE SUMMARY

THE LYCHEE

Is a sub-tropical fruit of great antiquity in China, where it is considered one of the world's finest fresh fruits.

Almost everyone likes it at first taste.

Fruits well in only a very few sections of the world.

Grows and fruits very well in parts of South Florida.

Tree fruits fairly young—4 to 6 years.

The Brewster variety deep freezes very well.

On suitable ground and with good care increases production an average of about 20 pounds per year for first 20 years or so—there is no reliable Florida experience beyond that.

In China said to produce heaviest from 50 to 100 years of age.

In China trees 1,000 years old are said to be still fruiting, which indicates freedom from exterminating blights.

About 50 trees to the acre for orchard planting.

Staminate and pistillate flowers on same tree.

Makes a beautiful dooryard tree.

Air-layered trees grow faster than citrus after about the fourth year.

On suitable ground and with good care the tree increases spread an average of about two feet each year, up to at least twenty years.

Is considered about as hardy when mature as the sweet orange.

Production in Florida will necessarily be limited due to lack of suitable land, much of which is planted to citrus.

Market price has increased steadily as supply reaches more consumers.

